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Reproductive Work and Female Labor Force Participation in Rural India

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Abstract:

The current debate over female labor force participation in India has failed to sufficiently account for the reproductive work of women. Using NSS data on reproductive labor, we investigate the possibility that a "reproductive squeeze" raises the opportunity costs of labor force participation for women. A variety of multinomial logit regressions reveal a robust positive relationship between the shares of non-discretionary food and non-food expenditure and the likelihood of performing reproductive labor, relative to being in the labor force. We also find that an indicator of greater social provisioning by the state is positively correlated with rural women's labor force participation, all else constant.

Keywords: female labor force participation, reproductive squeeze, reproductive labor, social provisioning, India

1.0 Introduction

Declining rural female labor force participation rates (FLFPRs) account for a significant share of the drop in overall labor force participation rates in post-liberalization India (Rangarajan et al 2011). Some authors have drawn upon Goldin's concept of a U-shaped relationship between female labor force participation and per capita income to explain this decline (Goldin 1995). They argue that Indian women are withdrawing from the labor market as a result of an "income effect" associated with increased household well-being (Abraham 2013, Das et al 2015, Sorsa et al 2015). Recent work has questioned the empirical and theoretical applicability of this hypothesis to India (Lahoti and Swaminathan 2016), and suggested that any income effect may be relatively small (Kapsos et al. 2014), restricted to more developed states (Mehrotra and Parida 2017) and weaker in the 2000s as compared to the 1990s (Afridi et al 2016).

On the other hand, there is evidence that the decline in agricultural employment since the 1990s has disproportionately hurt women in rural India (Mazumdar and Agnihotri 2011, Kannan and Raveendran 2012). An alternative explanation is thus that rural women have experienced a 'discouraged worker effect' with a decrease in demand for women workers forcing them out of the labor market (Das 2006, Afridi et al 2016).

These different explanations for declining FLFPRs do have one common characteristic: neither pays sufficient attention to the rise in women's labor of social reproduction that corresponds to this fall in FLFPR[1]. Some income effect proponents assume that rural Indian women who are not in the labor force are engaged in 'status producing' activities (e.g., Abraham 2011). This reflects social scientists' longstanding tendency to treat reproductive labor as non-work, despite a large feminist literature that establishes the importance of reproductive labor in producing and maintaining labor power and ensuring the survival of the household (Beneria and Sen 1981, Elson 2010). As feminists have shown, the labor of social reproduction is both physically and emotionally arduous, comprising the work of biological reproduction (including the production of children), the associated production of goods and services necessary for the maintenance of human life (such as the collection of water and fuel, cooking, etc.), as well as care work (Razavi 2007).

Of particular relevance to the Indian debate is the argument made by feminists that in times of crises, women's unpaid labor increases to ensure household survival, with increased time and effort spent on foraging for food and fuel, caring for dependents, and producing basic goods and services at home (Floro 1995, Elson 2010). This in turn then makes it harder for women to find paid work that will allow them to fulfill these increased reproductive responsibilities. In the 2000s, the period we are studying in this paper,

[1] Afridi et al (2016) do propose increased household productivity as one explanation for reduced FLFPR, but do not examine this effect more closely.

the Indian state engaged in minimal social provisioning (Palriwala and Neetha 2009). Households thus had to cope with growing expenditure on education and health amidst inadequate public investment in the infrastructure of basic services such as water, fuel or education, and declining access to the commons (Laxminarayana et al 2012, Hirway and Jose 2011, Basu and Basole 2015). Further, the effects of demographic changes that have unfolded over the last three decades are complex, with some aspects of such changes reducing women's reproductive labor, while others increase it (Razavi 2007).

We hypothesize that an increase in the burden of household reproduction plays a part in reducing female labor force participation in India, an argument we call the "reproductive squeeze". This argument overlaps with the discouraged worker effect in two ways. First, increased reproductive burdens narrow the range of jobs women can take while still bearing those burdens, increasing the likelihood of a failed job search; and second, for poor rural Indians, the absence of paid work means additional reproductive labor becomes necessary to produce the goods and services necessary for survival.

The quinquennial Indian National Sample Survey (NSS) data used in most research on Indian FLFPR includes data on reproductive work performed by women who are not in the labor force. After an early analysis by Sen and Sen (1985), this data been relatively neglected until recently. Recent studies have either called for, or analyzed, individual rounds of this data (Mukherjee 2011, Hirway 2012, Naidu 2016, Naidu and Ossome 2016, Siddiqui et al 2017), but we have not come across an analysis of this data across time. In this paper we contribute to the literature by empirically investigating whether a 'reproductive squeeze' may play a role in reducing women's labor force participation, even after controlling for any income effect.

As part of our broader attempt to treat reproductive work as an analytical category with its own dynamics, we also try to open up the 'black box' of reproductive labor to the extent that we can within the NSS data. The NSS divides reproductive labor into two categories, and in this paper we investigate the differences between these two categories over time. We find that this more fine grained analysis of the data casts further doubt upon the notion that women are retreating into purely "status producing" activities, with the largest increases being in relatively physically arduous activities related to food security.

We use data from the NSS employment and unemployment household surveys for 1999-2000, 2009-10 and 2011-12, thus covering India's 'boom years'. We exclude the 2004-05 NSS due to the fact that it was a 'distress' year that may have resulted in unusually high rural labor force participation rates (Abraham 2011). We include both the 2009-10 and 2011-12 data because these two rounds were conducted unusually close to each other – a gap of two years, rather than the usual five – with some researchers suspecting a political motivation for this timing. We do not take a side in this debate, but instead include both in our analysis and treat them as contemporaneous so as to avoid

excessively relying upon either one. Finally, we restrict our analysis to women of working age (15-64 years) who constitute 80 percent of the reduction in overall female labor force participation rates (Rangarajan et al 2011). The study of child labor is thus outside the scope of this paper.

2.0 Economic growth and rural India in the 2000s

India experienced an economic boom in the 2000s with real GDP growth averaging about 7.5% from the period 2000-02 to 2011-12. However, there are four characteristics of this boom that complicate its impact upon rural households, and thus upon the work that rural women do.

First, this growth has been sectorally uneven and its impact on employment has been gendered. Agricultural output grew at about half the rate of output in industry and services during this period. Agricultural wage and self-employment declined by 30.3 million between 2004-05 and 2011-12, with 81.2% of this decline accounted for by women (Thomas 2012). Rural non-agricultural employment growth was almost entirely accounted for by an increase in casual wage work in construction, work which is precarious and spatially fragmented. Furthermore, for women this growth was not sufficient to compensate for falling agricultural employment. Women accounted for only 17.9 % of the 25.9 million jobs created in the rural non-agricultural sector from 2004-05 to 2011-12 (Thomas 2012).

Second, most of the jobs created have been in the informal sector. The accompanying precarity has forced rural households to engage in multiple and shifting forms of livelihood generation (Naidu and Ossome 2016), including temporary, circular migration, which may affect the labor available for domestic tasks. Third, this growth, which has been driven in part by industries such as mining and real estate, has accelerated the privatization of the commons (Maringanti et al 2012). Along with a demographic shift that has caused a decline in average rural household size, this has implications for the effects of economic change upon reproductive labor.

Last but not least, this growth has not been accompanied by any significant shift in the gender division of household labor, particularly in rural India. Any analysis of the impact of this particular form of economic growth upon women's work thus has to take into account the fact that women must allocate their time between work that economists recognize as 'productive', as well as the unpaid labor of care work and domestic production. In this paper we refer to women's engagement in the former as 'labor force participation', and the latter as 'reproductive labor'.

The impact of economic growth on women's allocation of time is uncertain. Rising wages could increase the opportunity cost of reproductive labor, while technological advances make reproductive labor more capital intensive, and thus reduce the number of labor hours spent on such labor. Decreases in fertility rates could also mean a decrease in the demand for reproductive labor, as could greater public investment in basic services such as water and fuel provision, education (which serves as a substitute for

childcare), and the social safety net. We note below that in rural India, water collection from outside the village has become less widely reported, and some forms of food processing (such as the husking of rice) appear to have decreased in frequency. Thus even in the absence of a change in the gender division of labor, economic growth could result in fewer hours devoted to reproductive labor.

However, if growth does not enable the purchase of substitutes for household labor, i.e., due to lack of sufficient high quality employment and/or because other socially necessary expenditure (such as on health or education) grows even faster, unpaid reproductive labor may have to compensate to maintain household consumption. We note below both the relatively small increases in household income for the bottom three quintiles of rural households, as well as the increase in the share of expenditure on non-discretionary non-food items (particularly education, health and fuel) during the 2000s (Table 2).

These effects would be exacerbated by a decrease in access to the commons, as is occurring across India (Laxminarayana et al 2012). A majority of rural households still use bio-fuels such as firewood for cooking, and do not have access to tap water within their own homes. They thus depend on the commons to access the raw materials of social reproduction. An increase in the time required to collect the raw materials of social reproduction would reduce women's time flexibility, preventing them from being able to balance reproductive work with labor force participation (Hirway 2012).

The likelihood of such an effect increases to the extent that the state fails to subsidize reproductive activities, as is the case in India (Palriwala and Neetha 2009). Despite some increase in social sector expenditure shares by state and central governments in the second half of the 2000s, they have not returned to pre-liberalization peaks, and there is considerable evidence that public investment in social services remains inadequate (Planning Commission 2011). Indeed, Das et al (2015) show that greater social spending by the state increases female labor force participation, although they do not elaborate upon the connection to burdens of reproductive labor.

We are arguing here that the majority of rural households in India are unable to access substitutes for women's reproductive labor, even as the need for such labor increases. In the context of changing demographics and privatization of the commons, we see this need as driven by inadequate social provisioning for poorer households in conjunction with rising non-discretionary expenditure, creating a reproductive squeeze that forces a greater reliance on 'free' household production of goods and services (Elson 2010). In this paper, we therefore examine the impact of an increased share of non-discretionary household expenditure and the impact of state subsidization of food upon women's labor.

3.0 Economic vulnerability and female labor force participation

Following the NSS, we define 'labor force participation' (LFP) as employment in regular or casual paid work, self-employment (including an unpaid worker in a family business), or unemployment (which implies actively seeking employment)[2]. Table 1 lays out the decline in rural principal status women's labor force participation rates from 51 percent in 1999-2000 to 44 percent and 42 percent in 2009-10 and 2011-12.

We use NSS household expenditure data to generate real monthly per capita consumption expenditure (MPCE) in 2011-12 rupees, and divide the population into quintiles based on household MPCE. Table 2 demonstrates that the decline in employment is concentrated in the bottom three MPCE quintiles. In fact, there is actually an increase in FLFP in the top quintile. Table 2 also shows that lower quintiles in rural India have seen smaller increases in the average MPCE, with an average of a less than 2% per annum for the bottom three quintiles. Finally, the table shows that lower quintiles have larger expenditure shares on non-discretionary food and non-food expenditure shares combined, but also that, compared to the top two quintiles, they have experienced smaller declines in food expenditure shares and similar or larger increases in non-food expenditure shares

NSS data also indicate that the women who have withdrawn from the labor force are disproportionately likely to be female agricultural workers, women married to casual agricultural wage workers, and women with no formal education[3], i.e., those who have benefited least from India's boom. As Kapsos et al (2014) have previously argued, we expect any income effect to be small for such women.

4.0 Women's Reproductive Labor in the NSS data

The NSS collects data on reproductive labor under the category "domestic duties", which it further sub-categorizes as 'domestic activities' and 'domestic and allied activities'. 'Domestic and allied' activities, which we hereafter refer to as 'allied' activities, consists of domestic activities performed alongside at least one unpaid own-account production activity such as free collection of goods (vegetables, roots, firewood, cattle feed etc.), sewing and tailoring, weaving, processing food for household consumption etc. This set of activities is assigned activity status code 93 by the NSS. While the NSS does not explicitly define 'domestic activities', this category, which is assigned activity status code 92 by the NSS, presumably includes services for own-use such as the unpaid care of dependents, cooking

[2] The NSS reports both principal employment (employment for more than 185 days a year) as well as subsidiary employment (employment that lasts less than 185 days a year), but the bulk of the FLFPR decline is accounted for by changes in principal rather than subsidiary status. Further, there is a large overlap between subsidiary employment and principal status reproductive work. From the perspective of our data analysis, this means that coding principal and subsidiary status employment together as employment causes us to "lose" from our analysis a large share of those who represent themselves as principal status reproductive workers. As a result, we restrict ourselves to principal status LFP only.

[3] Tables available upon request

and cleaning (Mukherjee 2011). This category thus includes all forms of services produced for self-consumption.

The United Nations System of National Accounts (SNA) in fact includes many 'allied' activities, related to production of water, fuel and food, in SNA calculations even though these are not produced for the market (Razavi 2007). The NSS, however, excludes both allied activities and domestic activities from calculation of the official labor force. The official and problematic reason provided for not even including subsistence production of goods (allied activities) in labor force calculation is that such activities are carried out by an insignificant number of people (Hirway 2012). This exclusion from official statistics means that often these reproductive activities are perceived as unproductive leisure activities, a tendency which feminists have long criticized (Folbre 2004). Most contemporary studies of female labor force participation neither question this limited definition of the official labor force, nor differentiate between the categories of 'domestic' and 'domestic and allied' work (se Naidu 2016; Siddiqui et al 2017 for exceptions). Rather, the proponents of the income effect hypothesis treat reproductive labor as 'status producing' (e.g. Abraham 2011), and thus disregard the considerable body of work on the importance of reproductive labor to household survival and reproduction.

Table 1 indicates that allied work has increased over the 2000s, with the share of those reporting domestic work only either increasing by less than allied work (2009-10) or actually declining (2011-12). Further, Table 2 indicates that the share of women engaged in allied work has increased the most for the lower MPCE quintiles. This data provides ample cause to question the NSS' own claims about the supposed insignificance of these activities (Hirway 2012).

In the NSS interview module on allied activities, women who do not report being in the labor force indicate whether they perform each of thirteen tasks classified as allied activities. While the share of those reporting collecting water or preparing cowdung cakes (to use as fuel) has fallen, these remain amongst the most common allied activities (Table 3). The maintenance of poultry appears to have fallen, which may imply more dependence on market provision of meat and eggs. The percentage of women reporting tasks related to preparation of food inputs such as husking paddy, preparing meat, grinding food or preparing meat) has fallen quite substantially.

What is striking, however, is the increase in the share of women reporting a set of tasks related to food security, i.e., firewood collection, maintenance of kitchen gardens, and, to a lesser extent, an increase in the collection of free fruits and fish. Kitchen gardens and free collection of goods relate directly to the provision of food items, while firewood collection indirectly affects food security, firewood being the main source of cooking fuel in rural India. The degradation of or dispossession from private land and the commons may thus have a significant impact on allied

activities and hence food security (Naidu 2013). Hirway's analysis of the only Indian time use survey conducted in 1998 (see Hirway and Jose 2011), and past literature on rural dependence on the environmental commons in India (e.g. Beck and Ghosh 1994; Jodha 1986) suggest that the poorest households are most dependent on such activities for their survival.

If we narrow allied activities to labor and time consuming, but essential, activities of collection of water, firewood, fuel (including the making of cowdung cakes) and food items (including kitchen garden and poultry maintenance), we find that by 2011-12, 40% of women not in the labor force across all quintiles (and 45% of women in the bottom three quintiles) were engaged in one or more of these activities. The only activities on this list that involve being home-bound and do not involve substantial physical labor are sewing and tutoring, but shares for both have remained relatively stagnant over this period. Overall, the classification of allied activities as "status-producing" thus appears unwarranted.

Furthermore, around 60% of principal status domestic and allied female workers in 2009-10 and 2011-12 reported that they spent their time on domestic work because there was no-one else to help. The percentage who attributed this to social/religious constraints fell from 21% in 1999-2000 to 16% in 2011-12. This corresponds to our argument that reductions in the average size of the household may have also reduced women's ability to be flexible in the allocation of their time.

5.0 Regression Analysis: Correlates of Reproductive Labor and Labor Force Participation

We begin by establishing the socio-economic correlates of the three work status categories: women engaged in allied activities, domestic work only, and those in the labor force. We then estimate the impact of a reproductive squeeze upon women's allocation of time, while controlling for a possible income effect. In both cases, we interpret our empirical results not as proof of causality, but as partial correlates. We report results for all MPCE quintiles as well as the bottom three MPCE quintiles because the greatest decline in FLPR occurs in the latter group.

Our dependent (ordinal) variable is the principal work status of the woman, which can take three values: domestic work only, allied work, or labor force participation. The regressors include standard demographic variables such as age, age squared (since there may be a non-linear relationship between age and the division of labor in an Indian household), whether the woman is currently married, religious categories (Hindu versus all other religions), as well as caste categories (Dalit, Adivasi, and Other Backward Communities). These also stand in for cultural or social norms that shape the gender division of labor.

We include land possessed by the household in acres, which we expect to have a positive association with FLFP due to the demand side effect of women's labor in agriculture. Women's education levels proxy for possible wage earning capacity if employment is secured. Yet, without adequate supply

of jobs, higher educational attainment may yield a discouraged worker effect. We include three education-related dummy variables that represent women with primary, secondary and post-secondary education. Women without any formal education comprise the base/comparison category.

We include the log of real monthly household consumption per capita (log MPCE) as well as its squared term. In line with the literature, we employ consumption as an imperfect proxy for income (Abraham 2013, Das et al 2015). According to the income effect hypothesis, the level term would have a negative coefficient associated with a withdrawal of women from the labor force in response to higher incomes, whereas the squared term would have a positive coefficient suggesting an increase in FLFPR corresponding to an increase in income beyond a particular threshold. We also include time dummies in the regressions.

We include three variables to capture the effect of a potential 'reproductive squeeze'. Two of these variables relate to the share of basic food and basic non-food items. The share of basic food items includes expenditure on non-processed food items such as cereals, milk, eggs, vegetables, pulses and meat and excludes consumption of all processed food. The share of basic non-food expenditure captures expenditure on education, health, fuel/energy and conveyance. Combined, these represent non-discretionary expenditure as a share of total household expenditure. High non-discretionary expenditure indicates the extent of economic pressure on households. If unpaid reproductive labor serves as an economic shock absorber, as feminist economists have argued, then allied work and domestic work would be positively associated with shares of non-discretionary expenditure.

We also include a variable to capture state provisioning that might reduce a potential 'reproductive squeeze'. For this, we employ that state level average share of PDS (public distribution system) cereal consumption. Despite the state's reduced commitment to the program in the post-liberalization era, PDS is the only social provisioning program in India with continued widespread access. We expect it to be negatively associated with allied and domestic work, and positively associated with women's LFP.

To control for demographic determinants of demand for reproductive labor, we include other household demographic characteristics such as household size, the number of children under five years, and the number of economically active men in the household. Lower household size could reduce the demand for reproductive labor. However, it could also mean fewer adults to share reproductive burdens. Ceteris parabis, more adult men in the household could have the same effect.

5.1 The Regression Model

Since the three activity status variables are dichotomous, mutually exclusive and have no natural ordering, we adopt a multinomial logit model (see Greene 2012). We employ clustered standard errors to account for potential correlation in errors within the NSS first stage sampling unit, which is the village. This helps correct for what might otherwise be artificially small standard errors. We thus estimate a model where y is a vector of three unordered outcomes, i.e., y = 1, 2 and 3, and X is a matrix of regressors such that

$$\Pr(y = 1) = \frac{1}{1 + e^{X\beta(2)} + e^{X\beta(3)}}$$

$$\Pr(y = 2) = \frac{e^{X\beta(2)}}{1 + e^{X\beta(2)} + e^{X\beta(3)}}$$

$$\Pr(y = 3) = \frac{e^{X\beta(3)}}{1 + e^{X\beta(2)} + e^{X\beta(3)}}$$

The coefficients of the regression models represent relative probabilities such that

$$\frac{\Pr\,(y = 2)}{\Pr\,(y = 1)} = e^{X\beta(2)}$$

In other words, the coefficients are estimated correlations between the regressors upon the likelihood of a working age woman reporting LFP versus allied work, LFP versus domestic work, or domestic work versus allied work. The population under consideration is working age women and excludes those categorized as principal status students, retired or unable to work due to sickness, or those who report being 'beggars or prostitutes' (NSS activity categories).

Table 4 presents the baseline results for our statistical analysis in which we regress activity status (labor market, allied, and domestic) on the variables described above, in addition to state and time dummies to control for state-level and time (2009-10 and 2011-12) fixed effects respectively. In Table 5, we add the three provisioning variables (share of non-discretionary spending on basic food and basic non-food items, and share of PDS consumption) to the regression model. The inclusion of the additional variables changes the magnitude but not the sign of the coefficients thus indicating the robustness of our results. Since we have data on share of PDS only for 2009-10 and 2011-12, the regression presented in Table 5 is limited to these two time periods. We report results for all MPCE quintiles and the bottom three MPCE quintiles. The results are robust across different formulations[4].

[4] The regression results in Table 5 are largely unchanged when it is run with the expenditure shares, but not the PDS share. As an additional check (results available upon request) we added the state level HDI computed for 1999-00

5.2 Results

5.2.1. Differentiating between women's activity status categories

While domestic work, and domestic with allied work have been conflated in most of the literature, the coefficients for the 2009-10 and 2011-12 time dummies indicate statistically significant increases in allied work, but decreases in domestic work, that are unexplained by our independent variables (Table 4). This confirms the trend we noticed in the descriptive statistics section, and suggests that there may indeed be some independent dynamics of the allied work category that are worthy of further research. Given that we are unable to measure any change in access to the commons in this analysis, this may be a link worth exploring further in future research.

The coefficients for age, education, caste and religion all suggest a greater similarity between allied work and participation in the labor force, as compared to domestic work alone (see Table 4). This is not surprising given the definitional overlaps between allied work and LFP discussed earlier. An increase in household size also decreases the likelihood of allied work as well as LFP versus domestic work, while increasing the likelihood of LFP against allied work. An increase in the number of children, household size constant, increases the likelihood of allied work relative to domestic work, perhaps because there are then fewer other adults with whom to share burdens of allied work. These results indicate the importance of demographic factors in determining the allocation of women's labor time.

Since there is a greater increase in allied rather than domestic work (see Table 1), and the former is labor-intensive and related to subsistence production and food security, these results throw into question analyses that treat women's shift from LFP to reproductive labor as evidence of 'withdrawing' into high-status leisure-like activities. Instead, the shift may signify economic necessity in the context of demographic change and strengthens the argument for greater social provisioning by the state as a means of countering these structural tendencies.

Owning land is positively correlated with LFP, relative to both domestic and allied work, confirming the importance of the agricultural sector for women's employment. We thus note evidence for a discouraged worker hypothesis in our results. Given the decrease in average landholding over the years, part of the decline in women's LFP may be coming from declining demand for female agriculture labor. But whereas land ownership increases the likelihood of allied work versus domestic work for all quintiles, it has no statistical impact on allied versus domestic work for the bottom three quintiles. Most allied activities are heavily dependent on

and 2007-08. We found that states with higher HDI levels did see a higher likelihood of rural women's employment, particularly as compared to domestic work. We also found that the remaining results were unchanged, indicating their robustness.

access to private land or the environmental commons (e.g., Naidu 2013) but perhaps poorer households do not own enough land to be able to engage in allied activities on their own private land (as opposed to the commons).

While having primary or secondary education makes women less likely to be in the labor force than women without any education, having at least some college education increased the likelihood of LFP relative to both allied and domestic work for the whole sample. This may be because more jobs are available for highly skilled women workers who can enter the education or government sectors. In the bottom three quintiles the effect of college education was weaker, only increasing LFP relative to allied work.

We also control for any income effect by including the (log)MPCE and its squared term. While a U-shape relationship exists between consumption expenditure and LFP across all MPCE quintiles, the relationship is not statistically significant within the bottom three quintiles (see also Mehrotra and Parida 2017, who find no income effect for less developed Indian states).

Coefficients of other variables have the expected signs which remain unchanged for regressions of both all MPCE quintiles and the bottom three MPCE quintiles

5.2.2 The impact of the 'reproductive squeeze'

Our primary result is that, controlling for income effects, the shares of non-discretionary food and non-food expenditure are negatively and statistically significantly correlated with LFP relative to both domestic work and allied work for the whole sample as well as the bottom three MPCE quintiles (see Table 5). However, both expenditure shares are positively correlated with the likelihood of higher domestic work participation relative to allied work. In this too allied work appears to resemble LFP.

The variable pds_share measures the average share of PDS consumption of cereals by state. It suggests that a higher state average share of PDS cereal consumption increases the probability of LFP relative to allied and domestic work, without changing the other results. It also increases the probability of domestic work relative to allied work. In other words, social provisioning by the state appears to reduce the need to engage in the effort intensive work associated with allied activities. This also reinforces the finding of Das et al (2015) that greater state social sector spending can increase FLFP in India. However, given that the state's strategy appears to be to continue a reliance on private, market provisioning of these goods and services, our results suggest that FLFPR in rural India is unlikely to rise.

The coefficients reported in Tables 4 and 5 only report the relative probability of a particular activity status vis-à-vis another and therefore do not allow us to fully compare the sizes of the income effect and reproductive squeeze effect. Therefore, we calculate the average marginal effect (AME) or the average value of the effect of a unit change in the regressor on the probability of observing an outcome,

computed across all observed values of the regressor (Table 6). For the bottom three quintiles, the net effect of per capita household consumption expenditure is statistically insignificant. However, a 1 percentage point increase in the share of non-discretionary food and non-food consumption is associated with a reduction in the likelihood of women's LFP by 0.27 and 0.23 percentage points respectively and an increase in domestic work of 0.35 and 0.31 percentage points respectively. Not only does non-discretionary consumption have a greater negative impact on LFP relative to the income effect, but also the privatization of provisioning is more acutely felt in the lowest consumption quintiles.

The AMEs of expenditure shares upon allied work are statistically insignificant for all quintiles. This is likely because higher food and non-food expenditure shares lowered the probability of allied work relative to domestic work, while raising it relative to LFP (Table 5) weakening the net effect. The AME of the food expenditure share in the bottom three quintiles is statistically significant but negative, a result that again resembles the result for LFP.

The share of PDS, on the other hand, not only affects LFP positively, but its positive impact is much higher than the income effect for all consumption quintiles as well as for the bottom three quintiles. For a 1 percentage point increase in PDS provisioning, the likelihood of working age women participating in the labor market is 1.72 percentage points higher, but women are 0.39 and 0.79 percentage points less likely to engage in domestic activities and allied activities respectively in the bottom three consumption quintiles. This suggests that higher PDS provisioning could ease the burden of reproduction that is placed on women and free up the possibility of higher labor force participation. Particularly in households within the bottom three consumption quintiles, the existence of an income effect may be less important than the exigencies of reproductive burden in determining women's decisions about time allocation.

Taken as a whole, the results associated with the demographic variables as well as the basic shares of food and non-food expenditure undermine the argument that reproductive work is merely 'status producing'. They also point to the urgent need to address burdens of reproductive work in these households and mitigate the effect of a reproductive squeeze on women's labor. Greater state support for social provisioning that could keep the shares of non-discretionary expenditure in check would be a step in the right direction.

6.0 Conclusion

In the current debate over declining female labor force participation in India, insufficient attention has been accorded to understanding women's reproductive labor. While better data, particularly national time use data, would help produce richer analyses of changes in women's reproductive burdens, in this paper we attempt to show that more can be done even with the data that is available from the NSS.

We find evidence that declines in labor force participation for rural Indian women have been concentrated amongst women in the worst-off households. These are also the households that have gained the least from India's boom years, so that any income effect is likely too small to explain a reduction in FLFPR of the magnitude we have seen in rural India. By taking seriously the differences between NSS categories of reproductive labor, we also find that even after controlling for a number of demographic and socio-economic variables, there has been an increase in relatively physically burdensome "allied work", particularly when it comes to activities related to food security. We hope that future research will more closely investigate whether changing access to the commons is driving this outcome.

Regression results also suggest some meaningful differences in the way that demographic factors and land ownership affect domestic, as opposed to allied work. Given the limitations of the NSS data, this paper constitutes a preliminary step in understanding Indian women's changing work status. More research on the specific mechanisms that drive different kinds of reproductive labor would further our collective understanding of the constraints facing rural Indian women.

Our results suggest that higher proportion of non-discretionary spending increases the likelihood of allied and domestic work relative to labor force participation, whereas state provisioning increases the possibility that women are engaged in labor force participation relative to allied or domestic work. We therefore find evidence of a reproductive squeeze that raises the opportunity cost of labor force participation but could be mitigated by greater state provisioning. While we control for an income effect, we find that such an effect is statistically insignificant for the bottom three quintiles.

We conclude that a continuation of the pattern of Indian economic growth over the last two decades, with growing privatization of social reproduction, and the absence of work that allows women to combine their reproductive responsibilities with income generation, is unlikely to increase female labor force participation. Our analysis suggests that adequate social provisioning may need to be central to any set of policies aimed at increasing female labor force participation rates in rural India.

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Tables

Table 1: Work status for rural Indian women, ages 16-64 years

	Principal and subsidiary status combined			Principal status only		
	1999-2000	2009-10	2011-12	1999-2000	2009-10	2011-12
Domestic only	30	33	27	34	36	30
Allied	19	23	31	26	30	40
LFPR	51	44	42	40	35	30
Allied+LFPR	*70*	*67*	*73*	*66*	*65*	*70*

Table 2: By quintile, real MPCE, principal work status and basic shares of expenditure

	1999-2000 (1)	2009-10 (2)	Change from (1) to (2)	2011-12 (3)	Change from (1) to (3)
Quintile 1					
Average Real MPCE	460.80	518.50	12.50	563.60	22.30
Labor force participation rate	50.33	37.92	-12.41	29.71	-20.62
Share of allied workers	24.77	30.1	5.33	44.68	19.91
Basic food share	61.30	58.80	-2.40	56.60	-4.70
Basic nonfood share	13.50	17.90	4.30	19.50	6.00
Quintile 2					
Average Real MPCE	630.70	729.30	15.60	795.40	26.10
Labor force participation rate	43.45	32.71	-10.74	26.67	-16.78
Share of allied workers	26.33	30.79	4.46	45.71	19.38
Basic food share	58.80	56.50	-2.30	54.30	-4.50
Basic nonfood share	14.90	18.90	4.10	20.50	5.70
Quintile 3					
Average Real MPCE	775.20	915.40	18.10	1004.20	29.50
Labor force participation rate	40.34	32.79	-7.55	29.93	-10.41
Share of allied workers	26.79	32.93	6.14	41.17	14.38
Basic food share	56.70	54.30	-2.40	52.00	-4.70
Basic nonfood share	16.00	20.10	4.10	21.40	5.40
Quintile 4					
Average Real MPCE	973.80	1162.40	19.40	1297.10	33.20
Labor force participation rate	37.34	34.10	-3.24	33.11	-4.23
Share of allied workers	26.74	29.12	2.38	37.6	10.86
Basic food share	53.90	51.60	-2.30	49.10	-4.80
Basic nonfood share	17.90	21.60	3.70	23.50	5.60
Quintile 5					
Average Real MPCE	1623.40	2028.80	25.00	2326.10	43.30
Labor force participation rate	31.24	35.36	4.12	31.93	0.69
Share of allied workers	26.94	25.42	-1.52	31.29	4.35
Basic food share	46.80	44.30	-2.50	40.90	-5.90
Basic nonfood share	22.60	27.00	4.40	29.30	6.70

Table 3: Kinds of allied work as a share of all female working age rural non-employed workers

	Kitchen garden (1)	Poultry (2)	Free collection of fish/fruit (3)	Firewood (4)	Water (5)	The making of cowdung cakes(6)	Share performing at least one of (1) through (6)
1999-00	14	33	15	39	51	49	38
2009-10	25	26	19	43	37	33	39
2011-12	24	22	19	44	31	36	40
Change from 1999 to 2010	11	-7	4	3	-14	-15	1
Change from 1999 to 2012	10	-11	4	4	-20	-13	2
	Tutoring	Sewing	Paddy de-husking	Grinding food	Making gur	Meat and fish preparation	Basket making
1999-00	6	28	19	20	7	8	10
2009-10	7	30	14	14	4	6	8
2011-12	7	29	9	9	3	4	5
Change from 1999 to 2010	1	2	-5	-6	-3	-1	-2
Change from 1999 to 2012	1	1	-9	-11	-4	-4	-5

Table 4: Baseline Regression Results

	All Quintiles			Bottom Three Quintiles		
	Allied against domestic	FLP against domestic	FLP against allied	Allied against domestic	FLP against domestic	FLP against allied
log(mpce)	-0.462	-3.002***	-2.540***	-0.218	-1.638	-1.42
	(-0.275)	(-0.236)	(-0.27)	(-1.406)	(-1.491)	(-1.172)
log(mpce) squared	0.01	0.181***	0.172***	0.001	0.093	0.092
	(-0.019)	(-0.016)	(-0.019)	(-0.109)	(-0.116)	(-0.091)
land possessed	0.010*	0.025***	0.016***	0.013	0.041***	0.028***
	(-0.004)	(-0.004)	(-0.004)	(-0.008)	(-0.008)	(-0.008)
education primary	-0.251***	-0.553***	-0.302***	-0.232***	-0.472***	-0.240***
	(-0.018)	(-0.018)	(-0.019)	(-0.024)	(-0.025)	(-0.025)
education secondary	-0.508***	-0.651***	-0.143***	-0.553***	-0.732***	-0.179***
	(-0.025)	(-0.024)	(-0.027)	(-0.038)	(-0.039)	(-0.043)
education college	-0.719***	0.194***	0.913***	-0.887***	-0.263**	0.625***
	(-0.045)	(-0.039)	(-0.046)	(-0.094)	(-0.09)	(-0.1)
age	0.072***	0.177***	0.105***	0.080***	0.192***	0.113***
	(-0.003)	(-0.003)	(-0.004)	(-0.005)	(-0.005)	(-0.005)
age squared	-0.001***	-0.002***	-0.001***	-0.001***	-0.002***	-0.001***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
married	-0.022	-1.014***	-0.992***	-0.05	-0.953***	-0.902***
	(-0.02)	(-0.019)	(-0.021)	(-0.029)	(-0.028)	(-0.029)
hindu	0.200***	0.286***	0.086**	0.093*	0.200***	0.107*
	(-0.029)	(-0.028)	(-0.031)	(-0.038)	(-0.04)	(-0.042)
adivasi	0.487***	1.251***	0.765***	0.519***	1.353***	0.834***
	(-0.041)	(-0.04)	(-0.04)	(-0.052)	(-0.052)	(-0.051)
dalit	0.216***	0.484***	0.268***	0.293***	0.580***	0.287***
	(-0.027)	(-0.027)	(-0.029)	(-0.038)	(-0.04)	(-0.041)
obc	0.063*	0.263***	0.200***	0.105**	0.339***	0.234***
	(-0.025)	(-0.024)	(-0.027)	(-0.034)	(-0.037)	(-0.039)
household size	-0.052***	-0.036***	0.016**	-0.058***	-0.041***	0.017**
	(-0.004)	(-0.005)	(-0.005)	(-0.006)	(-0.007)	(-0.007)
children under 5	0.035***	-0.032***	-0.067***	0.055***	-0.029*	-0.084***
	(-0.009)	(-0.009)	(-0.009)	(-0.011)	(-0.012)	(-0.012)
maleworkercount	0.057***	-0.089***	-0.146***	0.036**	-0.111***	-0.146***
	(-0.01)	(-0.01)	(-0.011)	(-0.013)	(-0.014)	(-0.014)
round66	0.110***	-0.123***	-0.233***	0.098*	-0.308***	-0.407***
	(-0.032)	(-0.027)	(-0.032)	(-0.041)	(-0.038)	(-0.04)
round68	0.616***	-0.008	-0.623***	0.676***	-0.177***	-0.853***
	(-0.03)	(-0.027)	(-0.03)	(-0.041)	(-0.04)	(-0.04)
constant	1.695	9.621***	7.926***	0.321	4.234	3.912
	(-0.998)	(-0.866)	(-0.977)	(-4.553)	(-4.808)	(-3.776)

N	247341	247341	247341	116906	116906	116906
Log likelihood	-232737	-232737	-232737	-110649.26	-110649.26	-110649.26

*p<0.05, ** p<0.0, ***p<0.001. Standard errors in parentheses. State dummies were included, results available upon request

Table 5: Regression Results with Provisioning Variables

	All Quintiles			Bottom Three Quintiles		
	Allied against domestic	FLP against domestic	FLP against allied	Allied against domestic	FLP against domestic	FLP against allied
log(mpce)	-0.04	-1.587***	-1.547***	1.714	-0.56	-2.274
	(-0.313)	(-0.295)	(-0.318)	(-1.876)	(-2.238)	(-1.606)
log(mpce) squared	-0.02	0.079***	0.099***	-0.145)	0.013	0.158
	(-0.021)	(-0.02)	(-0.022)	(-0.144)	(-0.172)	(-0.123)
basicfood share	-0.681***	-1.272***	-0.591***	-1.418***	-2.338***	-0.921***
	(-0.15)	(-0.137)	(-0.148)	(-0.234)	(-0.235)	(-0.226)
nonfoodbasic share	-0.419***	-0.813***	-0.394**	-1.283***	-2.021***	-0.737**
	(-0.122)	(-0.111)	(-0.128)	(-0.246)	(-0.252)	(-0.251)
pds share	-1.169***	4.873***	6.043***	-1.223**	6.391***	7.614***
	(-0.31)	(-0.284)	(-0.263)	(-0.408)	(-0.414)	(-0.325)
land possessed	0.018**	0.040***	0.021***	0.022*	0.037***	0.015
	(-0.006)	(-0.006)	(-0.005)	(-0.01)	(-0.01)	(-0.01)
education primary	-0.245***	-0.537***	-0.292***	-0.203***	-0.475***	-0.272***
	(-0.021)	(-0.022)	(-0.023)	(-0.029)	(-0.032)	(-0.031)
education secondary	-0.521***	-0.703***	-0.182***	-0.528***	-0.770***	-0.242***
	(-0.029)	(-0.029)	(-0.032)	(-0.044)	(-0.047)	(-0.05)
education college	-0.768***	0.063	0.831***	-0.935***	-0.341***	0.594***
	(-0.05)	(-0.046)	(-0.052)	(-0.101)	(-0.099)	(-0.109)
age	0.079***	0.188***	0.109***	0.089***	0.206***	0.117***
	(-0.004)	(-0.004)	(-0.005)	(-0.006)	(-0.007)	(-0.007)
age squared	-0.001***	-0.002***	-0.001***	-0.001***	-0.003***	-0.001***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
married	-0.014	-1.210***	-1.196***	-0.084*	-1.214***	-1.130***
	(-0.026)	(-0.024)	(-0.027)	(-0.038)	(-0.038)	(-0.038)
hindu	0.230***	0.345***	0.115**	0.091*	0.194***	0.104*
	(-0.034)	(-0.033)	(-0.037)	(-0.046)	(-0.049)	(-0.051)
adivasi	0.432***	0.924***	0.493***	0.477***	1.019***	0.543***
	(-0.048)	(-0.047)	(-0.046)	(-0.063)	(-0.066)	(-0.061)
dalit	0.118***	0.332***	0.214***	0.173***	0.413***	0.239***
	(-0.033)	(-0.033)	(-0.035)	(-0.046)	(-0.051)	(-0.051)
obc	0.003	0.185***	0.182***	0.038	0.276***	0.238***
	(-0.029)	(-0.029)	(-0.032)	(-0.042)	(-0.048)	(-0.049)

household size	-0.059***	-0.028***	0.031***	-0.070***	-0.017	0.052***
	(-0.005)	(-0.006)	(-0.006)	(-0.007)	(-0.009)	(-0.009)
children under 5	0.045***	-0.024*	-0.069***	0.073***	-0.004	-0.077***
	(-0.011)	(-0.012)	(-0.012)	(-0.014)	(-0.016)	(-0.016)
maleworkercount	0.057***	-0.088***	-0.144***	0.028	-0.147***	-0.175***
	(-0.012)	(-0.013)	(-0.014)	(-0.017)	(-0.019)	(-0.019)
round68	0.560***	-0.035	-0.595***	0.628***	-0.074	-0.702***
	(-0.031)	(-0.027)	(-0.03)	(-0.042)	(-0.041)	(-0.04)
constant	0.954	4.556***	3.601**	-4.647	0.938	5.585
	(-1.151)	(-1.096)	(-1.166)	(-6.123)	(-7.298)	(-5.229)
N	148608	148608	148608	68122	68122	68122
Log likelihood	-138749.01	-138749.01	-138749.01	-63360.79	-63360.79	-63360.79

*p<0.05, ** p<0.0, ***p<0.001. Standard errors in parentheses. State dummies were included, results available upon request

Table 6: Average Marginal Effects, with provision variables

	All MPCE quintiles			Bottom three MPCE quintiles		
	Domestic activities	Allied activities	LFP	Domestic activities	Allied activities	LFP
log(mpce)	0.156**	0.114*	-0.270***	-0.147	0.387	-0.239
	(-0.05)	(-0.05)	(-0.05)	(-0.37)	(-0.27)	(-0.28)
basicfood share	0.196***	-0.029	-0.167***	0.352***	-0.082*	-0.270***
	(-0.03)	(-0.02)	(-0.02)	(-0.04)	(-0.04)	(-0.03)
nonfoodbasic share	0.124***	-0.016	-0.108***	0.311***	-0.082	-0.229***
	(-0.02)	(-0.02)	(-0.02)	(-0.04)	(-0.04)	(-0.04)
pds share	-0.338***	-0.590***	0.928***	-0.387***	-0.785***	1.172***
	(-0.05)	(-0.05)	(-0.04)	(-0.07)	(-0.06)	(-0.05)

*p<0.05, ** p<0.0, ***p<0.001. Standard errors in parentheses. Full results available upon request